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Tomatoes are the most important processed crop in Ohio with a planting acreage in 1983 of 19 thousand acres and 360 thousand ton production. Conditions for harvest the 1983 season were ideal and yield averaged 19 tons per acre. New planting practices, growing methods, machine harvest-bulk handling, and new processing technology require a continuous supply of better suited varieties in order that the industry be competitive with other production areas. Ohio remains the second largest processing tomato production state. This breeding work continues to be directed toward improvement of the whole-canned tomato (whole-pack) and diced tomato product. Other needs of the smaller canner are being given attention in relation to these products, as well as development of improved varieties for the processor of juice, sauce and paste production.

Selection for earliness and improved fruit setting ability, especially during periods of heat stress, is being carried out to reduce the problem of split fruit set so as to broaden and make possible more uniform delivery schedules. With increased direct seeding, greater emphasis is being given to seed germination cold tolerance. Other important characteristics being selected for toward more effective machine harvest and bulk handling include crack resistance, firmness and ability of ripe fruit to store well on the vine for extended periods to allow maximum useable ripe fruit recovery in once-over harvest. Thus, in addition to increased productivity, a major objective is more effective utilization of present yield, especially in regard to factors minimizing losses, due to overripe, rotted and green fruit. To reduce production costs, jointless pedicel (j2) is being incorporated into most of the newer lines to facilitate machine harvest and allow delivery of fruit free of stems.

Improvement factors being selected for include: acidity, pH, soluble solids, viscosity, color (crimson fruit color [og^c] and high pigment fruit color [hp]), vitamin C, and especially fruit attributes conditioning efficient lye or steam peeling characteristics and corelessness.

Recently Released Ohio Varieties

This season there was an increase in commercial acreage planted of the Fusarium-Verticillium resistant machine harvest cultivar Ohio 7870. Growers had very good yield results with it in hand as well as machine harvest. It was used in whole-canned and diced product as well as a variety of pureed products with continued good reports on its quality. Ohio 7870 acreage in Ohio, as well as

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surrounding midwestern states and eastern states, is projected to increase to several thousand acres in 1984.

Grower-processor results with Ohio 7681 continued good. High commercial yields were reported and commercial pack had good quality. Increased plantings are expected for 1984.

There was an increase in acreage of the newly released Ohio 7814, an early season Fusarium resistant, jointless pedicel, machine-harvest type with good firmness and holding ability, suitable for coreless wholepack, diced pack and pureed products. Yields and quality in commercial plantings through the Midwest and Canada were excellent and acreage of Ohio 7814 should increase in 1984.

Promising Ohio Advanced Breeding Lines

Ohio 832 is a main-season, Verticillium-Fusarium resistant line, crimson high color type, which has exhibited potential in commercial planting trials for hand, as well as machine harvest. It is firm and suitable for product or wholepack. Trial acreage will increase in 1984 and commercial seed lots will be available from ADI Distributors, Inc.

The following advanced lines in particular will be more extensively tested in grower trials and are being used in crosses in further breeding to attain higher levels of productivity and quality: Ohio 8136, 8239, 8243, 8245, 8295, and 8297. These lines represent improvements in earliness, disease resistance, fruit firmness, stem jointlessness, color and disease resistance.

New breeding lines are available which exhibit potential for improved productivity, disease resistance and quality over present varieties (Tables 1-5). The Research Center Trial crop was damaged by standing water earlier in the season and created much variation in the crop. Dry conditions the remainder of the season allowed for the recovery of performance and quality information from these trials. These trials are reported as follows:

Cultural Information

Location: Vegetable Crops Branch, Fremont, OH.

Plants: Greenhouse-grown, 108 per standard flat from seed sown April 12.

Transplanted to Field: May 25, a two-row transplanter using 21-53-0 starter at 5 lb. per 100 gal of water; 1/2 pint per plant.

Fertilizer: 800 lb. per acre of 0-26-26, October; 148 lb. per acre of 34-0-0, May 3.

Soil: Silty clay loam, fall bedded November 1982.

Herbicide: Devrinol 1 1/2 lb. ai May 4; Sencor directed spray 0.25 lb. ai July 1.

Plot Size and Spacing: One-row plots, 20 plants per row spaced 12 inches, row 5 feet apart; Trial I, 3 replications; Trial II, 3 replications. NTEP (Northern Tomato Exchange Program) plots non-replicated with 10 plants/plot.

Insect and Disease Control: Standard recommended program followed for insect and disease control.

Weather Data (Fremont, OH)

	Temperature		Rainfall (inches)	
	1983	29 Yr.Avg.	1983	29 Yr.Avg.
May	54.7	58.8	4.08	3.41
June	69.5	68.1	5.08	4.09
July	74.6	72.4	4.98	4.05
August	71.9	70.3	1.21	3.52

The weather in May was relatively cool. Rainfall was average, but some crop damage resulted from standing water. July through August above normal temperatures stressed much of the crop and this was intensified in August by below average rainfall. Smaller than usual fruit size and blossom end-rot were of consequence, but at harvest most favorable conditions allowed good recovery rates.

Harvest Information

Harvesting was with an FMC Tomato Harvester and was carried out when the entries were estimated to be at a stage of fruit ripeness in which yields of marketable fruit were approaching optimum recovery with a minimum of green and cull fruit (Tables 1 & 4). Percentages reported of fruit recovery are on a weight basis.

Quality Evaluation

Field run tomatoes were used for quality evaluation; the sample was cut in half, quartered, extracted in a Food Processing Equipment Co. Laboratory pulper, and de-aerated. All laboratory samples were harvested by hand on August 30 and evaluated on September 1.

1. Agtron E-5. Instrument calibrated at 48.
2. Hunter D-6 Tomato colorimeter (TCM).
3. Percent Soluble Solids. Abbe Refractometer.
4. Percent total acid as citric. The raw sample used for pH determination was directly titrated using 0.1 normal sodium hydroxide solution to a pH of 8.1.
5. pH was determined by the glass electrode method.
6. Vitamin C (ascorbic acid) standard procedure:

$$\text{Dye Factor} \times \text{ml of dye} \times 100 = \frac{\text{mgs Vitamin C}}{\text{100 gms}}$$

TABLE 1. Trial I. Field evaluation of processing tomato varieties and test lines for mechanical harvest when yields of marketable fruit were approaching optimum recovery. Vegetable Crops Branch, OARDC, Fremont, Ohio, 1983.

Variety or Test Line	Seed Source	Ripe Useable Tons/A	Ripe Useable % of potential	% of potential cull	Fruit size (oz)	Stems %	Stems joint
HARVEST DATE 9/1/83							
Ohio 7681	1	23.7	74	12	4.8	83	+
Heinz 722	5	23.1	86	8	2.4	0	j2
Ohio 7983	1	21.7	86	11	2.3	0	j2
Ohio 8239	1	21.0	87	9	2.8	0	j2
Ohio 8243	1	20.8	86	5	2.4	0	j2
Ohio 7814	1	20.7	85	10	2.3	0	j2
Campbell 4135	2	20.0	87	7	2.7	0	j2
Ohio 8283	1	19.2	88	7	2.3	1	j2
Ohio 832	1	18.7	82	9	3.1	61	+
Ohio 8129	1	18.4	83	12	2.4	0	j2
Ohio 7986	1	17.9	81	7	2.6	20	+
Ohio 8270	1	16.4	83	10	2.8	0	j2
Heinz 1784	5	15.5	80	12	2.0	0	j2
Ohio 8136	1	15.1	76	7	2.6	1	j2
Ohio 831	1	14.0	76	10	3.2	6	+
Heinz 2653	5	13.8	74	19	2.4	1	j2
FM 6203	13	13.4	78	11	2.8	1	+
Ohio 8153	1	11.7	76	13	3.0	3	j2
Peto 95	8	11.0	75	17	2.7	5	+
HARVEST DATE 9/12/83							
Ohio 8245	1	22.1	89	8	2.4	0	j2
Ohio 79122	1	18.4	79	11	3.0	53	+
PU 812	11	17.0	82	13	1.9	0	j2
Ohio 7870	1	16.6	81	12	2.8	63	+
Ohio 8297	1	16.3	80	14	2.7	1	j2
Ohio 8295	1	13.2	72	22	2.9	0	j2
LSD @ 5%		NS			0.54		

TABLE 2. Trial I. Laboratory evaluation of processing tomato varieties and test lines. Vegetable Crops Branch, OARDC, Fremont, Ohio, 1983.

Variety or Test Line	pH	% Citric acid	% Soluble Solids	Hunter CDM a/b	Agtron E5	Hunter D6 TCM	Vit. C
Ohio 7681	4.7	0.31	5.6	2.55	33	73	30.0
Heinz 722	4.5	0.49	5.4	2.65	33	77	30.9
Ohio 7983	4.5	0.44	6.1	2.57	30	76	34.7
Ohio 8239	4.6	0.35	5.8	2.54	30	73	28.9
Ohio 8243	4.5	0.38	5.4	2.63	31	74	35.0
Ohio 7814	4.5	0.45	6.0	2.81	29	79	35.3
Campbell 4135	4.6	0.40	6.2	2.63	30	75	40.4
Ohio 8283	4.7	0.37	4.4	2.66	30	74	35.4
Ohio 832	4.5	0.40	5.6	2.90	29	79	28.1
Ohio 8129	4.6	0.41	5.7	2.60	30	76	36.3
Ohio 7986	4.7	0.32	5.0	2.72	30	80	26.2
Ohio 8270	4.5	0.35	5.2	2.76	30	81	24.1
Heinz 1784	4.8	0.32	5.2	2.66	29	79	29.5
Ohio 8136	4.7	0.33	5.0	2.88	28	84	30.0
Ohio 831	4.5	0.46	5.3	2.89	29	77	22.8
Heinz 2653	4.7	0.37	5.6	2.62	30	73	32.4
FM 6203	4.7	0.34	5.7	2.63	29	78	33.5
Ohio 8153	4.6	0.32	6.2	2.59	30	77	34.8
Peto 95	4.6	0.31	4.7	2.55	32	77	26.0
Ohio 8245	4.5	0.33	4.4	2.35	33	67	30.4
Ohio 79122	4.7	0.31	5.0	2.80	28	86	30.6
PU 812	4.5	0.40	5.6	2.68	30	74	31.8
Ohio 7870	4.7	0.45	5.8	2.58	31	76	30.5
Ohio 8297	4.6	0.37	5.3	2.59	32	74	27.8
Ohio 8295	4.7	0.27	4.4	2.49	32	79	28.2

TABLE 3. Trial II. Field evaluation of processing tomato varieties and test lines for mechanical harvest when yields of marketable fruit were approaching optimum recovery. Vegetable Crops Branch, Fremont, Ohio, 1983.

Variety or Test Line	Ripe Useable Tons/A	Ripe Useable % of potential	% of potential cull	Fruit Size (oz)	Stems %	Stems joint
HARVEST DATA 9/1/83						
Ohio 8358	22.4	89	6	2.3	0	j2
Ohio 8383	20.3	78	10	2.8	3	j2
Ohio 831	20.2	78	10	3.1	5	+
Ohio 8376	20.0	79	16	2.6	2	j2
Ohio 8374	19.6	74	12	2.6	0	j2
Ohio 8395	19.4	81	13	3.4	0	j2
Ohio 8373	18.9	79	7	2.6	0	j2
Ohio 8355	18.5	78	12	3.4	1	j2
Ohio 8393	17.8	82	13	2.8	3	j2
Ohio 8378	16.9	79	11	2.3	0	j2
Ohio 8394	15.3	75	14	2.5	1	j2
Ohio 8354	13.6	79	13	2.7	1	j2
Ohio 8368	12.0	70	13	2.4	0	j2
HARVEST DATE 9/12/83						
Ohio 8363	25.6	90	8	2.5	0	j2
Ohio 8364	25.6	89	7	2.4	0	j2
Ohio 7870	16.0	80	14	2.6	53	+
Ohio 8371	15.2	70	23	3.6	0	j2
Ohio 8365	14.4	83	10	1.9	1	j2
LSD @ .05	NS			0.5		

TABLE 4. Trial II. Laboratory evaluation of processing tomato varieties and test lines. Vegetable Crops Branch, OARDC, Fremont, Ohio, 1983.

Variety or Test Line	pH	% Citric acid	% Soluble solids	Hunter CDM a/b	Agtron E5	Hunter D6 TCM	Vit. C
Ohio 8358	4.6	0.45	5.8	2.84	30	79	34.0
Ohio 8383	4.6	0.35	4.9	2.90	30	81	32.0
Ohio 831	4.5	0.37	5.2	2.64	30	76	26.5
Ohio 8376	4.7	0.36	4.6	2.70	30	78	34.0
Ohio 8374	4.6	0.33	4.7	2.69	31	79	29.4
Ohio 8395	4.7	0.31	5.4	2.67	32	75	28.1
Ohio 8373	4.7	0.32	4.5	2.59	31	79	29.0
Ohio 8355	4.6	0.38	5.7	2.72	30	80	28.9
Ohio 8393	4.7	0.31	5.5	2.46	35	72	32.3
Ohio 8378	4.5	0.45	5.5	2.84	31	73	32.8
Ohio 8394	4.5	0.50	5.2	2.59	32	72	26.9
Ohio 8354	4.6	0.41	5.6	2.72	30	78	27.9
Ohio 8368	4.5	0.35	5.2	2.38	32	73	28.3
Ohio 8363	4.5	0.40	5.5	2.69	30	76	31.8
Ohio 8364	4.5	0.38	5.3	2.82	30	78	31.0
Ohio 7870	4.7	0.28	5.0	2.50	31	78	28.5
Ohio 8371	4.6	0.27	5.0	2.50	33	78	29.3
Ohio 8365	4.5	0.42	5.2	2.38	32	73	28.3

TABLE 5. Evaluation of 1983 N.T.E.P. (Northern Tomato Exchange Program), OARDC, Fremont, Ohio. (Rating Score: 5 excellent - 1 poor).

NTEP Entry No.	Cultivar	Source	Earliness	Cover	Set concentration	Fruit size	Firmness	Separation	Styler scar	Internal color
8301	Ont 822	7	4	4	5	5	2	3	2	3
8302	US82B17	10	3	4	4	5	3	2	4	2
8303	O 831	1	4	4	4	4	3	3	5	3
8304	PU 82-15	11	2	2	5	2	2	4	5	2
8305	Md 158	9	5	3	5	3	3	4	3	4
8306	O 833	1	3	3	4	2	4	4	5	4
8307	Ont 828	7	4	4	3	4	2	3	4	5
8308	AVX 6007	12	3	4	3	5	2	3	3	4
8309	US82B41	10	5	4	4	4	2	4	5	4
8310	Ont 823	7	4	5	4	5	4	4	3	5
8311	C 37	3	3	3	4	5	4	3	3	4
8312	PU 82-16	11	3	3	5	2	3	3	4	2
8313	Md 159	9	5	2	5	4	3	3	4	4
8314	O 832	1	4	4	3	5	4	3	4	4
8315	Ont 824j	7	5	2	2	2	3	4	4	5
8316	US82B40	10	3	4	3	3	3	3	4	3
8317	PU 812	11	5	3	4	5	4	3	4	5
8318	O 8136	1	4	3	2	3	4	3	3	4
8319	Md 161	9	2	3	4	3	4	4	4	4
8320	O 8153	1	4	3	3	5	2	2	3	3
8321	Ont 826	7	5	2	4	4	4	4	4	4

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